



Brief Instructions
For Making
OBSERVATIONS
IN ALL

Parts of the World:

AS ALSO

For Collecting, Preserving, and Sending over
NATURAL THINGS.

BEING

An Attempt to settle an **UNIVERSAL**
CORRESPONDENCE for the Advance-
ment of Knowledge both Natural and Civil.

Drawn up at the Request of a Person of Honour:
and presented to the **ROYAL SOCIETY.**

L O N D O N:

Printed for Richard Wilkin at the King's Head in
St. Paul's Church-Yard, 1696.

1. 29. 1695

Imprimatur,

Decemb. 29.
1695.

Robert Southwell, V.P.R.S.



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*Brief Instructions for the making Observations, and
Collections, in order to the promotion of Natu-
ral History, in all parts of the World.*

I. *At Sea.*

K EEP a *Journal* of the *Ship's Course*: Of the *Latitude*, as often as taken: Of the *Variation of the Com-
pass*: of the *Soundings*, observing what sorts of *Shells*,
Sand, or other Matter is brought up with the *Plum-
met*. In *Calmes*, or with any other Opportunity, both at *Main
Sea*, or elsewhere, *sound* to the *Bottom*, if all the *Line* or *Tackle*
you have will reach it; but if not, only note what *Length* of
Line you used. In the said *Journal* also keep an *Account* of the
Currents: of the *Brizes*, and other *Winds*, as well those which
are settled and constant, as those which are accidental: of *Storms*
and *Hurricanes*: of the *Rise* and *Fall* of the *Weather-glass*: Of the
Weather, *Heat* and *Cold*, *Fogs*, *Mists*, *Snow*, *Hail*, *Rain*, *Spouts*
or *Trombs*, vast *Discharges of Water* from the *Clouds*, *Thunder*,
Lightning, *Meteors*, &c. Observe whether some *Seas* be not *saltier*
than others, or distant *Parts* of the same *Sea* differ not in *Saltness*:
Whether the *Water* of the *Sea* be not *warmer* than ordinary, or
suffer not some unusual *Bubbings* or *Commotions* before *Storms*, or
there do not some other like uncommon *Accidents* forerun them,
whereby they may be foreseen: What *Voragines* or *Whirlpools* ap-
pear at *Sea*, to what *Distance* the *Force* of their *Flux* or *Stream*
extends, whether they only receive and swallow in the *Water*,
or spue it forth, or, if both, with what *Periods*, i. e. at what time
doth each begin and end: What sorts of *Fowls* occur at *Main Sea*:
What *Fishes*, what *Weeds*, *Shrubs*, or other things. In brief,
take notice of every observable natural Occurrence throughout the
whole *Voyage*, and this too in as full and circumstantial a manner
as may be.

Observations
to be made at
Sea.

II. Upon the Sea-shores.

Upon the
Shores.

Observe to what perpendicular *Height* the *Sea* rises at *high-water*: what *Space of Time* passes between the *Ebb* and *Flood*, and again, between *Flood* and *Ebb*: What kinds of *Fish* reside near the *Shores*, particularly what *Shell-fish*: What *Fowl* are most frequent there: What *Weeds*, *Shrubs*, &c. also what *Shells*, are *flung up* by the *Sea*: What *Shrubs*, *Weeds*, *Mosses*, *Sponges*, *Coralls*, or *Coral-line Bodies*, e. g. *Sea fans*, *Sea-roses*, &c. grow out upon the *Shores*, *Rocks*, or *Cliffs*: What sorts of *Pebbles*, *Flints*, *Marchasites*, or other *Stones*, lie upon the *Shores*, or are washed out of the *Cliffs*, by the *Tides*, and *beating* of the *Sea-waves*: Whether there be not found *Grains of Gold*, or *Silver*, or *Lumps* of other *Metalls*, or *Minerals*, *Amber*, *Crystal-pebbles*, *Agates*, *Cornelians*, or other *Stones* that have somewhat *observable* in them, either for *Lustre*, *Texture*, or *Figure*; and particularly *Stones* that resemble *Muscles*, *Cockles*, *Periwinkles*, or other *Shells*. But more especially take notice whether by great *Inundations*, *Storms*, or *Hurricanes*, there be not *thrown up* out of the *Sea*, some sorts of *Shells* that are not *flung up* ordinarily, and at other times; as also whether upon the *Seas beating down*, and *washing away* the *Earth* from the *Cliffs*, there be not *disclosed* *Glossopetra*, *Teeth*, *Bones*, or *Shells* of *Fishes*, that were originally lodged in those *Cliffs*, but since *beaten* and *washed out*, these being commonly somewhat *decayed*, as also more *dusky*, *foul*, and *black*, than those *Shells*, &c. which are *thrown up* by the *Sea*.

Directions to
the Dyvers,
for Pearl, Co-
ral, and Am-
ber.

In all such Places where there is any sort of *Dyveing*, and particularly for *Pearls*, observe what sort of *Earth*, *Sand*, or other *Terrestrial Matter*, is found at the *Bottom of the Sea*: What *Weeds*, *Shrubs*, &c. what *Shells* of all kinds, or other *Bodies*, taking a particular account of all the several kinds of *Shell-fish* that *yield Pearl*; as also at what *Distance* from the *Shores* the *diveing* is made: To what *Depth* and how long the *Dyvers* can endure under *Water*. In the *Coral-fishing* observe in what *Manner* or *Posture* the *Coral*, particularly that which is *shrubby*, and the *Sea-Fans* grow; whether *upright*, *horizontally*, or *flatwise*, or hanging with the *Heads downwards*: To what *Bodies* it *grows* or *adheres*: Whether it *grow* only in such *Parts* as are constantly *covered by the Sea Water*, or such only as are *uncovered* when the *Tide* is down,
or

or *both* indifferently : If constantly under Water, whether in the the *Shallower*, or *deeper* Parts of it : And whether it grow chiefly in such Places of the Water that are *calm*, and *still*, or where it is more *rough* and agitated by beating against the Rocks, Cliffs, &c. Of how many several Colours it is : And to what *Bigness* both the rude *Coralline Masses*, and the *Shrubs*, and other *Coralline Bodies* ever arrive. The same Directions may serve indifferently for the *Amber-fishers*, with this only Addition, that they carefully observe whether the *Amber* be not also found in the *Earth*, and *Cliffs*, in all such Places where it is found upon the *Shores* : And whether that which is *thrown up* by the *Seas Flood*, may not justly be presumed to have been *born down* from the *Cliffs* by its foregoing *Ebb*.

III. At Land.

1. TAKE an exact account of the *Brizes*, and other ordinary *Winds*, with the *Quarter* from whence they blow, what time they *begin*, and how long they last : Also of other *Winds*, *Storms*, and *Hurricanes* : As likewise of the *Weather*, *Heat*, *Cold*, *Fogs*, *Mists*, *Snow*, *Hail*, *Rain*, *Thunder*, *Lightning*, *Meteors*, &c. with the *Seasons* of the Year most obnoxious to these *Rains*, &c. Their *Quantity* : The Time of their *Duration* : keeping also a Register of the *Weather-glasses*, both *Thermometer* and *Barometer*.

Observations
of the Wea-
ther at Land.

2. The following *Experiment* being of considerable Importance, as serving to determine several Difficulties in the *Natural History* of *Rains*, *Vapours*, &c. and being likewise very easily tried, it is desired it may be done with Care and Exactness in all Parts of the World. Get some *Vessel* either of Copper, Wood, or Earth, about 2. Foot wide, (or if wider the better) and at least a Foot and half deep ; be sure it be *firm* and *sound*, and that it do not *leak* in the least. Fill it about $\frac{3}{4}$ full of *Water* : Cover it over with a *Net*, or very thin fine *Wier-grate*, to keep off *Birds*, or other Creatures from drinking the Water ; and then set it *forth*, either upon the *Leads* of some flat-roof'd House, or in the midst of a Garden, or some other fit Place, where the *Sun* may shine upon it *all Day* from Sun-rising to Sun-setting, or at least as much as may be. Then with some *Rule* or *Measure* take the *just perpendicular Depth* of the *Water*, noting down the *Depth*, and the *Day* of the Month, and so leave the *Vessel* *standing out*. Once or twice a Week (or oftner, if either the *Rain* be so much as to fill the *Ves-*

An Experi-
ment to be
made.

fel, and endanger its running over, or the *Heat* and *Drought* such as to quite dry up all the Water. for either of these *Accidents* will elude the Experiment) *Visit the Vessel*, and take nicely the *Depth* of the Water, noting that *Depth*, (in a Register to be kept for the purpose) and the *Day* of the Month; and if it be *dry Weather*, so that the Water is *evaporated* and *sunk lower* than it stood when the Vessel was first set forth, then *put in* just as much *more Water* as will raise it to its *original Height*: But if it hath *rained*, so that the Water is *raised higher* than it was when first set forth, after that the just *Measure* of it is taken, and noted down, *take out* so much of the *Water* as to *reduce* it to the *Level* at which it stood when first set forth. This Experiment ought to be *continued* thus for *one whole Year* at least, but longer if possible; only during the *Time of Frost*, no *Observation* need be made, the Water in the Vessel then neither rising nor falling.

Observations
concerning
Springs.

3. Let there be an account taken of all *Springs*; both the standing or *stagnant* ones, and those which emit forth their Water, forming *Brooks*, and *Rivers*; observing whether they *rise* out of high or low *Grounds*; whether they be *turbid* or *clear*: *hot* or *cold*: Whether they *ebb* or *flow*: Whether they *incrust* or *petrify* *Sticks*, *Straws*, or other *Bodies* that lie in them: Whether they contain *Bitumen*, *Petroleum*, *Salt*, *Nitre*, *Vitriol*, or other *Mineral Matter* in their Water. Upon what *Occasions*, or at what *Seasons* chiefly their Water *increases*, or *decreases*. In the *Running Springs* observe the *Quickness* of the *Stream*, and *Quantity* of the *Water* discharged.

Concerning
Rivers and
Lakes.

4. As to *Rivers*, observe their ordinary *Depth*, *Breadth*, and the *Quickness* of their *Stream*: The several sorts of *Fishes*, particularly the *Shell-fish* in them: All sorts of *Plants* that grow in them. On their *Shores* take notice whether there be not *Amber*, *Cornelians*, or other *Stones* valuable either for their *Colour*, *Texture*, or *Shape*, and particularly whether any *Stones* that in *Figure* resemble the *Shells of Muscles*, *Cochles*, *Perewinkles*, or the like. The same *Directions* for the main may serve for *Lakes* and *Meers*, only it were to be wished that these were carefully *sounded*, and their *Depths* taken, in several *Parts* of them.

Concerning
Metalls, Mine-
rals, Stones,
Earths, &c.

5. Observe the several sorts of *Marls*, *Clays*, *Loams*, or other *Soils*, at the *Surface of the Earth*: And whether there be not almost every where a *Coat* of one or other of these at the *Surface*, whatever else lyes *underneath*. Take an Account of the several sorts of
Metalls

Metalls that the Countrey yields: As also of the *Minerals*, *Rock-salt*, *Allum*, *Vitriol*, *Sulphur*, *Nitre*, *Loadstone*, *Cinnabar*, *Antimony*, *Talk*, *Spar*, *Cryſtal*, *Diamonds*, *Amethyſts*, *Topazes*, *Emeraulds*, and other precious *Stones*: Their *Number*, and the manner of their *Growth*: Likewise of *Marchaſites*, *Amber* (for it is found in the Earth and at Land as well as at Sea) *Selenites*, *Belemnites*, *Flints*, *Pebles*, &c. in what manner they are found, and at what *Depths*: In what *Quantities*, and whether the *Metalls* and *Minerals* are *ſeparate* and *pure*, or *mixt*: Of what *Figure* they are, and whether the ſaid *Metalls*, *Minerals*, precious *Stones*, &c. lie in the *Beds* of Earth, *Cole*, *Chalk*, *Stone*, &c. or in the *Veins*, *Clefts*, or perpendicular *Intervals*, of the *Stone*, *Marble*, &c. Endeavour to get Information whether *Metalls* or *Minerals* have a *Natural Growth*, or a *Natural Decrease*, in any Part of the *Mine*: And what *Rules* the *Miners* give for the *Discovery* of *Metalls* and *Minerals latent* in the *Earth*; or by what *Signs* they find them. Alſo take Account of the ſeveral ſorts of *Stone*, *Marble*, *Alabaſter*, *Cole*, *Chalk*, *Okers*, *Sands*, *Clays*, and other *Earths*: Their *Depths*: The *Thickneſs* of their *Strata* or *Beds*: The *Order* in which they lie: the *Situation* of their *Beds*, whether level or not.

In deep *Quarries*, *Mines*, *Cole-pits*, &c. obſerve in what manner the *Water* comes in: in what *Quantity*, and at what *Season* of the Year it abounds moſt: and whether it be *clear* and *taſteleſs*, or be impregnated with *mineral matter*. Take an account of the *Damps*: of what kind they are: what *harm* they do: at what *ſeaſon* chiefly they happen: and whether there be not *Sulphur*, or *Nitre*, or both, in all Places where there are *Damps*. Obſerve alſo the *Heat* of *Mines*, by *Aſſiſtance* of the *Weather-glaſs*, if to be had, both *Summer*, and *Winter*, noting how much it exceeds, or falls ſhort of the *Heat* at the *Surface* of the *Earth*: and whether it be not greater at certain *Depths*, than at others. And enquire whether in *Mines*, *Colepits*, deep *Grottoes*, or *Caverns*, the *Work men* are not ſenſible of *Guiſts* of *Wind* breaking forth of the *Bowels* of the *Earth*.

6. Get an Account of all *Grottoes* or *Natural Caverns* in the *Earth*: their *Breadth*, *Depth*, *Length*: what *Rills* or *Rivers* of *Water* paſſes them: what *Metallick*, *Sparry*, or other *Mineral* *Incruſtations* cover their *Stones*, or hang down, like *Icycles*, from them. Get an Account likewise of the ſeveral *Mountains*, and *Rocks*: the *Stone*, *Marble*, or other matter, of which they conſiſt: what *Plants* grow upon

Of *Water*, of *Wind*, and of *Heat* in *Mines*: alſo of *Damps*.

Concerning *Grottoes*, and *Mountains*.

upon them: what *Metalls* or *Minerals* they yield: what *Springs* or *Rivers* issue out of them: the Height of them: especially it is much to be desired that the height of *Pico Teneriffe*, of the highest *Alps*, and *Pyrenæes*, of *Mount Atlas*, of the Mountain called the *Table*, nigh the Cape of good Hope, of the *Armenian*, *Persian*, and *Chinese Mountains*, and of the *Andes*, and other high Mountains in *America*, were exactly taken by *Observation*. Enquire farther, whether they are not by little and washed away by *Rains*, and so become lower: whether their *Tops* be not covered with a *Fog*, or *Mist*; especially before *Rain*: whether some of the highest of them have not their *Tops* covered with *Snow*, a great part, or all the Year: whether at some times great *Quantities of Water* do not burst forth of them; with the *Season* that this happens, and whether attended with *Heat*, *Thunder*, *Lightning*, *Storms*, or what other *Circumstances*: whether some of them emit not *Sulphureous*, or other *Steams*, *Flores Sulphuris*, *Nitre*, or *Sal-Ammoniack*: whether any send forth *Heat*, *Smoke*, or *Flames*, as *Ætna*, and other *Volcanoes* do: and whether near such there be not constantly *Thermæ* or *Hot-springs*.

☞ Of Sea-
Shells, and o-
ther Marine
Bodies, at Land,
in Stone, &c.

7. But in regard that *Sea-shells*, *Teeth*, and *Bones of Fishes*, &c. are found very plentifully in *England*, and many other Countries, as well upon the *Surface of the Earth*, and the *Tops* of the highest *Hills*, as within the *Earth*, in *Cole-pits*, *Mines*, *Quarries*, &c. the said *Shells*, *Teeth*, &c. being lodged amongst the *Cole*, in the *Mafs* and *Substance* of even the hardest *Stone*, *Marble*, &c. 'tis very extremely desirable that careful search be made after these things in all *Parts* of the *World*, and an account kept where-ever they are found; particularly search ought to be made after these *Shells*, and other *Bodies*, at the *Tops*, and on the *Sides* of *Rocks*, and the *Stone* of the said *Rocks* be broken with *Hammers*, or other fit *Intruments*, to discover the *Shells* lodged within the *Stone*. And it would be of very great Use if the *Top* of *Pico Teneriffe*, and of the rest recited in the foregoing Section, and indeed of all high Mountains whatsoever, were thus well examined by those who have Opportunity of doing it. Search likewise ought to be made upon the *Surface of the Earth* for the aforesaid *Sea-shells*; and for *Stones* that resemble them, especially upon the higher *Grounds*, as *Hills*, and particularly those which are plowed, where these *Shells* are very frequently found in great Numbers, and this too at great Distances from any *Sea*. But above all, where-ever there is any digging for

Me-

Metalls, Minerals, Marble, Stone, Chalk, Cole, Gravel, Marl, or in short any other *terrestrial matter* whatever, if *due Enquiry* be made, there will be found of the abovenamed *Shells* in the said *Marble, Stone, Chalk, Marl, &c.* And in the *Cole*, and *Stone* above it, are frequently found *Fern* and other *Plants*, and sometimes in other *Stone* too, especially that which is very *fine* and *compact*. Wherever these *Shells, Teeth, Plants, &c.* are found, the Enquirer may please to *note*, along with the *Place*, what *sorts* of *Shells* they are: and whether they be of the *same kinds* with those found upon the *Shores* of those *Parts* or not: in what *Numbers* they are found: at what *Depths*: and what *Earth, Sand, or other Matter*, they contain in them.

8. In *Stone, Marl, &c.* there are sometimes found *Trees*, of several kinds, *buried*, and, along with them, *Nuts, Acorns, Pine-Apples, &c.* but much more commonly are the said *Trees* found buried in *Moors, Boggs, and Fens*, especially those out of which the *Peat-Earth*, or bituminous *Turfs* are digg'd for *Fewel*. Where *Trees* are thus found, be pleas'd to *Note* what *kinds* of *Trees* they are: and whether there be of the *same sorts* now growing in the *Country*: what *bigness* they are: and whether they be *intire*, with *roots*, and *branches*, as well as *Trunks*: in what *numbers* they are found: at what *depth* in the *Earth*: in what *kind of Earth*, or other *matter*, it is that they lye: and what *else* is found along with them.

9. Take an account of the more observable and peculiar *Diseases* of the *Country*, with what *seasons* of the year are most subject to them: and of the other *Casualties*, particularly *Earthquakes*, noting all circumstances that *precede, attend, and follow after* them: e. g. the condition and *temperature of the Air*, as to *heat and cold, wet or dry, thick or clear, calm or windy*, before the *Earthquake*: and whether the *Springs* are *warm, turbid*, or *emitt Sulphureous* or other offensive *steams*: noting likewise the *extent* of the *Shock*, to what *distance* it was felt, and whether in all places precisely at the *same minute of time*: how great was the *force* of the *Shock*: whether it *crackt and tore the earth*: removed any tract of *Ground*: raised, or sunk it in: whether any *beat, fire, water, &c.* issued out at the said *Cracks*: whether, in case there be any *Vulcanoes*, or burning *Mountains*, near, they *emitt not flames* with greater *violence and noise* than usual, at the time of the *Earthquake*, or a little *before*, or *after* it: or whether they *spue not forth water*: whether the *Water* of the *Wells, Springs,*

⌘

Concerning
Trees found
buried in the
Earth.

Of Diseases,
Casualties,
Earthquakes.

Springs, and *Rivers* thereabouts do not become warm, turbid, or send forth more *Water* than usual, at the time of the *Earthquake*: whether the Neighbouring *Therme*, or *Hot-springs*, if any, become not more hot, and muddy, than before; whether the *Sea* adjacent does not become warm, or hot, and suffer great *Commutations*, and extraordinary *Tides*, at that time: whether there follow not great winds, rains, thunders and lightning after the *Earthquake* is over: and whether fevers, and other distempers do not then invade the inhabitants of those parts, yea the very beasts, fowl and fish: whether lastly, *Earthquakes* happen in any, unless mountainous, cavernous, and stoney, Countries, and in such as yield *Sulphur* and *Nitre*.

Concerning
Plants and A-
nimals.

10. As to the vegetable and animal productions of the Earth, observe whether the Country be fruitful or barren; what kinds of *Trees*, *shrubs*, and *herbs* it produceth that we have, and what kinds that we have not in *England*: whether in those Countries that lye betwixt the *Tropicks*, the *Plants* be not all in perpetual verdure, without ever falling all their leaves: and whether they have flowers, green, and ripe fruit upon them all the year round: or whether there be any of those sorts of *Plants* there which are called annual ones, and dye yearly: or any whose tops, and all, save their roots, dye away, and sink into the ground for some time, but afterwards spring forth and grow up afresh, as *Daffadils*, *Tulips*, and other bulbous *Plants*, do here; also what *Fowls*, what *Beasts*, *Serpents*, *Lizards*: what *Flies*, *Moths*, *Locusts*; what *Beetles*, *Grasshoppers*, *Spiders*, or other *Insects*: what *Tortoises*, *Snails*, or other *Creatures* cover'd with Shells, are found living upon the Earth.

An Appendix relating to the Natives of Guinea, Monomotapa, and other the less known parts of Africa: of the East, and West Indies: Tartary, Greenland, or any other remote, and uncivilized, or Pagan Countries.

1. **A**S to their Bodies, observe the features, shapes, and proportions of them; but more particularly the features of their faces: their Eyes whether large, or small: their Noses whether flat

flat and low, or sharp and raised: their *Hair* long, or short and curled or woolly: the *colour* of their *Skin* whether white, brown, tawny, olive, or black: the *colour* of their *Infants* when first born: whether *white* people removing into *hot* Countries become by degrees *browner*, &c. and *Blacks* removing into *cold* Countries, paler: whether *People* that inhabit the Countries which are *hottest*, be in Complexion of all the *blackest*: whether there be true *Negroes* Natives of any parts of the *world*, besides *Guinea*, and the adjacent parts of *Africa*. Observe also the *size* or bigness of their *Bodies*: their *strength*, *agility*, &c: and to what *age* they commonly live. Observe likewise whether they *paint* their bodies: *what* parts of them they paint, *what* colours they lay on: *what* figures they paint: and *how* they do it.

2. Observe their *Tempers*, *Genius's*, *Inclinations*, *Virtues*, and *Vices*. Their *Man-*

3. Enquire into their *Traditions* concerning the *Creation* of the *World*, the *universal Deluge*, the *People* from whom they are de- Their *Tradi-*
scended, and the *Country* from which they *Originally* came. tions.

4. Enquire into their *Notions* touching the *Supreme God*, *Angels*, or other inferior Ministers: whether they pay any *worship* or re- Their *Religi-*
verence to the *Sun*, the *Moon*, the *Earth*; to *high Mountains*, to *Rocks*, *Grottoes*, or *Caves* in the *Earth*: to the *Sea*, *Lakes*, *Rivers*, *Springs*: to *Serpents*, or other *Animals*: to *Trees*, *Woods*, or *Groves*: and whether they do not use to build their *Temples*, and set up their *Altars*, or *Images*, in *Groves*. Enquire into all their o-
ther *Religious Doctrines*, and *Ceremonies*: their *Sacrifices*: whether they offer *Men*, or *Children*: their *Idols*: their *Priests*: their *Temples*, *Altars*, *Feasts*: their *Lustrations*, or *Purifying* themselves by *Water*: their *Sortileges*, or *casting of Lots*: their *Divinations*, *Charms*, and *Conjurations*: Also their opinions concerning the *Devil*, and whether they pay any sort of *adoration* to him: likewise their *Doctrines* concerning the *Soul* (its *Immortality*, its *Transmigration* into men, or other *Creatures*,) and a future *State*: their *Customs* and *Usages* at the *birth of Children*, and in the *education of youth*: their *Ceremonies* at *Marriages*, at *Funerals*, and whether they *burn*, or *bury* their *Dead*: if the latter, whether they *embalm* the body, or *dry* it, and *bury money*, *Victuals*, *Cloths* &c. along with it: the
form of their *Tear*: the *time* it *begins*: the *method* of their *Compu-*
tation of time, and to how many years backwards their *Tradition* reaches. Their *Laws* and *Govern-*
ment, their *Arts* and *Sci-*
ences, with their *Customs* both *Civil* and *Military*.

5. Get an Account of their *Laws*, and *Civil Government*: their *Military*.

their *Language*, their *Learning*: their *Letters*, and whether they write on *Paper*, the *leaves of Palms*, or other *Plants*, *Bark of Trees*, &c. or, *instead of writing*, use *Painting*, and *Hieroglyphicks*: their *Musick*: their *Diet*: their *Agriculture*, or *Tillage*: their methods of *Hunting*, *Fowling*, and *Fishing*: their *Physick*, *Surgery*, and the *Simples* they use: their *Poysons*; their *Navigation*, and the *make* of their *Vessels*: all their other *Arts*, and *Sciences*: their *Manufactures*, *Traffick*, *Commodities*, *Money*, *Weights* and *Measures*; whether they understand the melting and ordering *Iron*, and other *Metals*: their *Apparel*: their *Houses*, and other *Buildings*: their *Utenfils*, and *Instruments*, whether made of *Iron*, *Stones*, *Fish-bones*, *Shells* &c. their *Exercises*, and *Sports*: their *Government* and *Discipline* in *War*: their *Weapons*, *Bows*, *Arrows*, *Darts*, &c. their *Warlike Instruments*, *Drums*, *Tambours*, *Cymbals*: their *Punishments*, and *Executions*. To be brief, make enquiry into all their *Customs* and *Usages*, both *Religious*, *Civil*, and *Military*; and not only those hinted in this Paper, but any others whatever.

Directions for the Collecting, Preserving, and Sending over Natural things, from Foreign Countries.

What things
to choose, and
how many of
each.

1. **I**N the *Choice* of these Things, neglect not any, tho' the most ordinary and trivial; the *Commonest* Pebble or Flint, Cockle or Oyster-shell, Grass, Moss, Fern, or Thistle, will be as useful, and as proper to be gathered and sent, as any the rarest production of the Country. Only take care to choose of each the fairest of its kind, and such as are perfect or whole. As to the Number, six or eight of each sort is enough; But where so many of the same sort are not to be easily got, send one, two, or more as they can be procured.

All Places and
Seasons afford
somewhat
worth the Ob-
serving and
Collecting.

2. For the *time* of making *Observations* none can ever be amiss; there being no *season*, nor indeed hardly any *place* wherein some Natural Thing or other does not present it self worthy of Remark: yea there are some things that require Observation all the Year round, as Springs, Rivers, &c. Nor is there any Season amiss for the gathering Natural Things. Bodies of one kind or other

other presenting themselves at *all times*, and in Winter as well as Summer ; only for Amber, Onyxes, and other Stones that lye *in the Sea Cliffs* : as also for the *Glossopetræ*, Teeth, and Shells that are *there*, search may be made to best purpose *after Storms*, because they are then chiefly beaten and *washed out* of those Cliffs. So likewise for the *Gold Grains*, Stones of all sorts, and Shells that are found upon *Mountains*, search ought to be made especially *after Rains*, because *these* wash of the Soil, and so discover them.

3. It were very well that there were *sent over* hither some Specimens of *all Natural Bodies whatever* : To begin with *Fossils* ; Let there be sent Samples of all the several *Varieties* of *Marble*, *Ores of Metals*, *Native Minerals of all kinds*, e. g. of *Antimony*, *Sulphur*, *Nitre*, *Alum*, *Talc*, *Sparr*, &c. of the *Metallick*, *Sparry*, *Vitriolick*, *Nitrous*, *Aluminous*, and other *Iceycles* that are found hanging down in *Grottoes*, and the *Fissures* of *Rocks* : the *Crystallized Sparrs*, *Salts* and *Ores* : *common Pebbles*, *Flints*, *Marchasites*, &c. I call that a *Variety* wherein there is any difference as to *Colour* or outward Appearance, or in *Weight*, in the *Quantity* of the *Metallick* or *Mineral matter*, or in the *manner* of its *mixture*. Of the forementioned, three or four of *each Variety* will be enough : but for *Agates*, *Cornelians*, *Amber*, *Crystal*, *Diamonds*, *Amethysts*, *Selenites*, *Belemnites*, or (as the *Vulgar* calls them) *Thunderbolts*, and the like, be pleased to send (of those which are found *single and loose*) six or eight of each, wherein there is any difference in *Figure*, *Bigness* or *Colour* : but for those which grow together (in *Clusters* or *Bunches*) to the *Rocks*, send Samples of them with *part of the Rock* to which they grow. As to those *Stones that resemble Cockles*, or other *Shells*, be sure to send six or eight of each wherein there is any the least difference, &c. For the *Sea-shells*, *Teeth* and *Bones*, that are found *at Land*, *on Hills*, &c. and those which are digged up out of the *Earth*, and lye loose in *Gravel*, *Chalk*, *Marle*, &c. six or eight of each sort will be sufficient ; but for those which are found lodged in *Marble* or *Stone*, and are not easily got out *single*, send *pieces* of the said *Marble* and *Stone*, of *all sorts*, with the *Shells* so lodged in them ; choosing only to break off (for these Samples) *such parts* of the *Stone* that contain the *fairest* and most *entire Shells*, and such wherein they lye *thickest*. The same likewise for the *Fern*, and other *Plants found in Cole*, *Slate*, &c. It were also not amiss that there were Samples sent over of the *Nitre*, *Sal Ammoniac*, *Flores Sulphuris*, *Cinders*,

Minerals: and
Fossil-Shells,
of all sorts, to
be sent.

How to be
packed up.

and other Bodies, that are flung forth of the *Vulcanoes*.

4. In order to the sending over these Stones, Minerals, Ores, Fossil-Shells, Teeth, &c. each ought to be put up carefully in a piece of Paper (the Place where 'twas found being first noted thereon) by it self, to prevent rubbing, fretting, or breaking in Carriage: and then all put together into some Box, Trunk, or old Barrel, placing the heaviest and hardest at the Bottom. Those Minerals which are tender and easie to be broken, as also the tenderer kinds of Fossil-shells, ought to be put up carefully together in a Box that is not large, and (besides the Papers) Cotton, Chaff, or Bran, put up with them, the better to secure them.

Plants of all
sorts to be sent
over: and how
to gather
them.

5. As to Plants (as well those that grow at Sea, in Rivers, and Lakes, as those which grow at Land) four Samples of each kind (wherever there is any difference in Colour, or Figure, of the Leaf or Flower) will be sufficient. Where the Plant is large, as in Trees, Shrubs, and the like, a fair sprig, about a foot in length, with the Flower on, if that be to be had, may suffice: but of the lesser Plants, such as Sea-Weeds, Grasses, Mosses, Ferns, &c. take up the whole Plant, root and all. Chuse all these Samples of Plants when they are in prime, I mean in Flower, Head, or Seed, if possible; And if the lower or ground Leaves of any Plant be different from the upper leaves, take two or three of them, and put them up along with the Sample.

Plants how to
be dried, and
preserved.

6. To preserve these Samples of Plants, put them each separately, betwixt the leaves of some large Book, or into a Quire of brown Paper, displaying and spreading them smooth and even. The next day, and afterwards three or four times at due distance, shift them into other Books or Paper, till they are sufficiently dried, when a weight may be laid upon them to press and smooth them; and so keep them, in some dry place, till they be sent over, sending them in Quires of brown Paper, and writing on the outside in what Country the inclosed Collection of Plants were gathered. For, both for these, and all other things, 'twill be proper to put up the Productions of each Country apart, or at least with such distinction that it may be known whence they all came.

Seeds, and
Fruits, of all
sorts, to be
sent.

7. Be pleased likewise to send Samples of Seeds of all kinds of Plants, even the most Wild and Common. But gather them not till they are Ripe, and then put each sort by it self in a piece of Paper, and, along with it (if to be had) a leaf and flower of the Plant off which 'twas gathered, writing on the said Paper the Names (if

(if any) by which the *Country people* call the Plants to which they belong'd, and the *Medicinal*, or other *uses*, they make of them. Also Samples of such *Nuts*, *Pods*, *Berries*, or other *Fruits*, that will keep. But both these and the Seeds ought to be *well dried* before they are put up, and to be afterwards *kept dry*. I had like to have forgot to desire that Patterns might be sent over of all such *Woods*, *Barks*, *Roots*, *Gumms*, *Rosins*, *Nat. Balsoms*, &c. that are of any *use*, or have any thing *remarkable* in them: likewise of all sorts of *Fus-balls*, and *Musbrooms* which are hardy and will keep, as most of those that grow out of Trees will: but for the *Earth-Musbrooms*, which are more tender, they ought to be put up in Glasses filled with Rum or Brandy; many of them being so very elegant and curious, as well to deserve such care in the preserving of them.

8. In like manner *Roots of Plants* would be very acceptable. And there are many Sorts of them that, with very little trouble, might be so ordered that they would *grow* again when brought over, and *set* here, tho after a long Voyage. Particularly those which are *Bulbous*, *Tuberous*, and *Fleshy*; Such as the *Roots of Tulips*, of *Lillies*, *Crocus's*, *Onions*, *Garlicks*, *Squills*, *Anamonies*, *Potatoes*, *Taums*, &c. These, I say, and all like *Roots*, may be sent as easily and safely as *Seeds*, if taken up out of the Ground, and laid to dry till the Ships come away, and then only put in *very dry Moss*, *Coton*, or *Sand*.

Then for all kinds of *Ferns*, or *Brakes*, *Maiden-Hairs*, *Polypodyes*, *Harts-tongues* &c. which are indeed a very Beautiful Family of Plants, their *Roots* may be *taken up*, (to be in readiness) and laid again into the *Ground*, and covered there, in some shady place, till the Ships are ready to Sail; when each root need only be enclosed or wrapt up in a lump of *Clay* or *Loame*, and then put up into a Box with *Moss*, and so sent over. In the same manner may *Roots of Gingers*, *Turmericks*, *Flower-de-luces*, and the like be sent. As also of all sorts of *Arums*, or *Cuckoopints*, *Herb-Dragons*, &c.

9. Yea the very *intire Plants* themselves will, several of them, keep so long that they may be securely sent over hither; and will, if Set, grow afterwards, and thrive well enough. Such as all the kinds of *Aloes*, *Sempervives*, *House-leeks*, *Prickley-Pears*, *Turks-Caps*, *Euphorbiums*, *Torch-thistles*, or indeed any others that are of a very *juicy*, *crass*, or *thick substance*. These need only be *hanged up in the Air*, at the top of some *Cabbin*, to keep them from rotting, and they will come safe without any further trouble.

Roots of many Plants may be so ordered as to grow when brought over into England.

Particularly of the Fern-kind.

Some whole Plants will grow when sent over hither.

10. For

Beasts, Fish,
Fowl, Ser-
pents, &c. to
be sent, and
how.

10. For all *larger Creatures*, whether *Beasts, Fish, or Fowl*, 'twill be best to take off their *Skins* carefully and well, and send only one or two of each. But for the *lesser Creatures*, such as *small Birds, and Fishes, Lizards, Camelions, Salamanders, Serpents*, and such like, they may be most of them well enough *preserved by drying*, especially if their *Guts and Entrails* be taken out. Unless you rather think fit to put some of the more *rare, curious, and tender*, into small *Jars*, filled with *Rum, Brandy, or Spirit of Wine*, which will keep them extremely well; and you may safely put as *many* of them into the same *Vessel* as it will well hold without crowding them, filling it up afterwards with *Rum, &c.* and then carefully *closeing* it up. Of each of these three or four will be enough.

Coralls, and
Shells to be
sent.

11. As to *Sponges, Brain-stones, Sea-fanns, Sea-roses, Corals* of all sorts, *Crabs, Lobsters, Sea, River, and Land Shells*, whether common or uncommon, great or small, send five or six of each, wherein there is any *Difference in Figure, Colour or Bigness*. Of the *Shells*, where they are easie to be got, chuse those that have the *Creatures still living* in them (which yet ought to be *pluckt out*, or they will putrifie and stink) such being by much the *freshest and fairest*: but where such are not to be got, take the empty and dead *Shells* as you find them; only of the *Bivalves* or double *Shells*, endeavour to send *both the upper and under Shell together*.

Star-Fishes,
and Sea-urch-
ins.

The several sorts of *Starr-fishes*, and of those round *Shells* (beset with *Spikes or Prickles*) which are called *Sea-eggs, or Sea-urchins*, are all very beautiful, and deserve well to be preserved. The *Starr-fishes* may be very easily dried, or put up into *Brandy*, and so sent. But the *Sea-urchins* are *very tender and brittle*, so that 'tis not so easie to preserve them, especially *with their Spikes on*, which 'tis greatly desirable might be done; and of all, those that are beset with the *largest Spikes*, are the most *rare and curious*, so that too *great Care* and *Exactness* cannot be bestowed in *Preservation* of them. If they will not dry well, they ought to be put up, each by themselves in *Vessels* of *Brandy, e. g. Gallypots* just big enough to contain them, so that they may not *shake*, and be thereby *dispoiled* of their *Prickles*. But if any of them are capable of being dried, they may be put up (*with their Spikes on*) carefully with *Coton in Pill-boxes* that just fit them.

Directions to
the Fishers for
Pearl, Amber,
and Corall.

At the *fishings for Pearl, Amber, or Coral*, save *Samples*, not only of the *several sorts of Pearl-shells* (as also of the *Pearls* themselves of all *Sizes, Figures, and Colours*) of *Corals*, and of *Amber*, but

any

any other thing, whatever it be, that either the *Divers*, the *Nets*, or the *Engines*, bring up out of the Sea along with them. These Shells, and several sorts of Shells, Corals, &c. ought to be put up each in *Pa-* Corals, how per, and then all into some Box, with Coton, Bran, or Chaff, to be put up, and great care taken of those that are small, tender, and brittle. and sent over.

12. The greatest Difficulty of all will be to preserve, and send Flies, and In- over safe, the *Flies* and *Insects*, by reason of the great *Tenderness* sects, how to of them. Endeavour to procure some of all the several sorts of be sent. of these, not exceeding 3. or 4. of each. *Worms*, *Grubbs*, *Caterpillars*, *Spiders*, *Beetles*, *Grashoppers*, &c. will keep best if put up, as many as conveniently may together, in *Bottles* with *Brand*, &c. But the several sorts of *Flies*, *Bees*, *Wasps*, *Butterflies*, &c. ought to be put upon *Pins*, and stuck to the Bottoms, Sides, and Tops of small Boxes; but care must be taken that they stick very fast, for if one of them fall off and get loose, 'twill tumble about, and so break and destroy all the rest that are in the Box.

13. It were likewise not amiss to send over some of the *Idols* of Some of the the *East* or *West Indians*, or any other of the less civilized Nati- Idols, Pictures, ons, as also of their *Pictures*: their *Writing*, whether upon *Paper*, Money, &c. of the *Savages* to or the *Leaves* or *Bark* of *Trees*: their *Money*, *Weights*, *Measures*: be sent over. their *Instruments* of any kind: their *Domestick Utensils*: their *Habits*, or the things they wear, *Skins* of *Beasts*, *Feather-dresses*, *Rings*, *Beads*, &c. their *Medicines*: their *Poysons*: their *Musical Instru-* ments: their *Weapons*, *Bows*, *Arrows*, *Darts*, especially those that are headed or pointed with *Flints*, *Bones*, or *Shells*: their *Drums* and *Tambours*, &c.

But for these, and especially for the *natural things*, that are thus A Caution a- sent over, great Caution ought to be used that the Boxes wherein bout the send- they are, be not turned topsyturvy, or much tumbled and shaken in ing the Boxes carrying to and from the Ship. And above all, that the things be to and from the Ship: and not broken, or rifled and confounded by the *Custom-house Officers* about the Of- and *Searchers*; which may be prevented by giving timely notice ficers of the Customs. to your *Correspondents* here to get a *Warrant*, from the Honourable the *Commissioners* of the *Customs*, that the *Cases* and *Boxes* may not be searched on Ship-board, but brought into the *Custom-house Ware-house*, and that some careful person attend there at their opening, to see that no Inconvenience or Damage befall them.

There remains now only one thing more to be hinted, and The Conclusi- that is, in regard the *Observations* to be made both at Sea and on, to the Col- and are very many, and the *Plants*, *Minerals*, and *Animals*, to lectors of these Natural things. be

be collected, are also very *numerous*, 'tis not expected that any one *single Person* will have *leisure* to attend to *so many things*, and therefore 'tis only requested that he make such Observations and Collections, more or less, as may be best *suitable* to his Convenience, and to his *Business*. If there be *never so few Observations* made, or things collected, yet even they will be very *gratefully received*. But for such curious, and inquisitive Persons who shall generously bestow a yet *greater Diligence* and Application in the Promotion of these many of them to very *useful and considerable Parts* of *Knowledge*, the learned and better Part of Mankind will be so much the more *highly obliged unto them*. And here are many of these things, especially the gathering and preserving of Insects, Shells, Plants, Minerals, &c. *maybe done by the Hands of Servants*; and that too at their spare and *leisure times*: or in *Journies*, in the *Plantations*, in *Fishing*, *Fowling*, &c. *without Hindrance of any other Business*, the things herein desired being *common*, and such as (one or other of them) occur in almost all Places.

Some Additions to be inserted each in their proper Places.

Pag. 1. line 18.

WHether some Seas be not *salter than others*.] This may be tryed partly by boyling or *evaporating* an equal Quantity of the Water of *different Seas*, and then observing what *Proportion of Salt* each yields: and partly by finding the several *Gravities of the Waters* of the said Seas by means of the Instrument mentioned Numb. 4. in the List beneath. By the same Instrument may the *Weight* of the Waters of *Mineral-springs*, *Hot-bathes*, and *Lakes*, be tryed; which it were to be wish'd might be done in all Places. But above all, Enquiry should be made whether the *Sea*, in some Parts of it, and *Lakes*, have not their *Water* impregnated with *Nitre* and other *Minerals besides Salt*. This may be discovered by the *Taste* or *Smell* of the Water: by *evaporating* it, or some other proper means. The different *Colour*, *Thickness*, and *Muddiness* of the Water of the *Sea* and *Lakes* ought likewise to be noted.

Pag. 2. line 2.

What perpendicular Height the Sea rises at high-water.] I mean how much it rises above the Level of low-water. Observe further at what *time of the Moon*, and *seasons of the Year*, the *Sea ebbs lowest*, or *flows highest* in any Place; not neglecting to note all other

other Accidents and *Circumstances* of the *Tydes* whatever they be.

Things flung upon the Shores by the Sea.] Amongst the rest look diligently for *Amber-gris*, the Natural History of which is yet very little known. 'Tis supposed to be cast up by the Sea; but whether it be so really, or be drawn out of the adjacent Cliffs (as many other Bodies are, that were supposed to be owing to the Sea) is to be determined by *future Enquirers*; who would do well not only to make *this* a Part of their Consideration, but to observe likewise its colour, smell, and taste: The *Quantity* of it: what other *Bodies* are mixt with it, or lye near it: Also the *condition* of the Sea thereabouts, whether *turbulent* usually, or *calm*: whether the Water be *frothy* or *oily*; and, to be short, all other *circumstances* that may give any light into this matter.

ibid. line 6.

Of Winds.] Also of the different *Effects*, *Constitutions*, and *Temperatures of Winds*, which *hot*, which *cold*: which *moist*, or attended with *Mists*, or *Rain*: which *dry*, &c.

Pag. 3. line 17.

Of Springs.] And whether there do not sometimes happen extraordinary *Eruptions*, or *vast discharges of water* out of them, without any externally apparent Cause. The same also concerning *Lakes*: as likewise concerning *Grottoes*.

Pag. 4. line 16.

Rivers.] And whether *these* do not also suffer *sudden and unusual Eruptions of Water* forth of their *Sources*: whether they have not periodical *Inundations*, occasioned by the great *Rains* that fall at certain Seasons, as the *Nile*, *Ganges*, and several other *Rivers* have: how *high* the *Tides* rise at their *Ostia* or outlets, and how *far* they flow up them; with the *periods*, of the flux or reflux.

ibid. line 27.

Mines.] How *deep* are the deepest *Mines* and *Colepits*: whether there be not *water* continually *draining* and *ouzing* through the *Ores of Metals*, and the *Spar*, and other *Minerals* that lie in the *Cliffs* of the *Stone*: what are the peculiar *Diseases* that attend the *Miners*: what *Mines* are chiefly detrimental to *Health*, and whether there be not some that are observed considerably to *shorten* the *Lives* of the *Miners*: also whether the *Smoke*, *Asbes*, &c. that fall upon the *Grass* near the *Forges* and *Smelting-works* be not hurtful to the *Cattle* that feed upon it: Lastly, Whether the very *Waters* of the *Springs*, *Rivers* and *Brooks* near, especially about *Lead-Mines*, are not sometimes *infected* with the *Mineral steams*, so as to be likewise *noxious* to the *Cattle* which drink of them.

Pag. 5. line 21.

*A List of such Instruments, and other things, as
may be serviceable to those Persons who make
Observations, and Collections, of Natural Things.*

1. **T**HE *Weather-glass* now lately contrived by *Robert Hook*,
M. D. Professor of Geometry in *Gresham College*, and
S. R. S. of use at *Sea* as well as at *Land*.

2. The common *Barometer*.

3. The common *Thermometer*.

4. The *Hygrometer*, or small Glass Instrument, with the
Neck or Stem graduated into small Divisions, serving to try
and compare the Gravity of Liquids, Waters, &c.

5. A *Dipping-needle*; in order to observe the several Degrees
of its Inclination in all Parts, both at Sea and Land.

6. A large *Quadrant*, for taking the Height of Mountains, &c.
also for the making *Astronomical Observations*, &c.

7. A *Level*, whereby to judge of the Situation (in respect of the
Horizon) of the Beds of Earth, Stone, Marble, Cole, &c. in
Mines, Quarries, Cole-pits, &c.

8. A two-foot-rule, or other like Measure, exactly graduated, as
well to take the Depth of the Water in the Experiment related
above page 3. as for other Uses.

9. *Hammers*, bigger and smaller, to break, and examine the in-
terior Constitution of Ores, Native Minerals, Stones, &c. with
a *Chissel* wherewith to dis sever or strike off shells from the Mass
of Stone, Marble, &c. conf. pag. 6. and pag. 11. above.

10. *Crucibles*, *Fluxing-powders*, &c. for melting and tryal of Ores.

11. An *Eradicator*, or small Iron Instrument to take up the
Roots of Herbs out of the Earth.

12. Several *Quires of brown Paper* to dry and keep Plants in.

13. Several Nests of *Dutch*, or *Pill-Boxes*: also *Deal Boxes* of
several Sizes, in which to put up, and send over Natural Bo-
dies.

14. *Bottles*, *Jars*, *Gally-Pots*, or other like Vessels, wherein to
put the more tender Creatures, with Spirits &c.

15. *Spirit of Wine*, *Rum* or *Brandy*, to preserve the said Crea-
tures, e. g. Insects, Lizards, Serpents, &c.

16. A *Solution of Mercury Sublimate*; or the same in Powder; a small part of which may be dissolved in a little Water, by boiling it gently in a Pipkin; which Pipkin ought to be kept for this only purpose, it being dangerous to put it to any other use, the Sublimate being a Poison. When the Liquor is Cold, a little Spirit of Wine may be added to it, if to be had. The use of this Solution is to chase and rub upon the *Insides of such Animals* whose Entrails are taken forth (as Page 14. above) in order to dry and preserve them; this serving to fence off Worms and Insects from preying upon them, preventing also the falling off of the Hair or Feathers, and securing them against Putrefaction, Stinking, &c.

It would be of incredible advantage to this Design, were all the Thermometers and Hygrobaroscopes used in it adjusted nicely and exactly after some one common Standard. Which would be a Thing very easie to be done, were they all bought of the same Person. Nor can I, if I may presume to recommend one for this purpose, nominate a fitter than Mr. Hunt, Operator to the Royal Society at Gresham College; who will not only procure the two mentioned, (graduated very carefully) or indeed any of the other Instruments, but likewise be ready to direct any one, who shall desire it, in the method of using them; or to advise and assist them in any other thing tending to the promoting of this Design. For the Thermometers, were they thus all of them, adjusted to the same Standard, (to be kept constantly in the Repository at Gresham College, where any Man might have recourse to it) 'twere easie to make a true and certain Estimate of the Heat or Cold in any part of the World where these Thermometers were used, for they would all of them constantly answer to one another, in what Country soever they were. By this means the Heat or Cold of all Places in the same Climate or under the same Latitude may be compared and known, for any, or all, Seasons of the Year. The same way may a comparative judgment be made of the Heat or Cold of Climates tho never so different and distant: the Heat of one Countrey or Place may be conferred with another; of one Mine, Cole-pit, Grotto, or other subterranean Cavern, with another: the temperature of Valleys or Plains with that of higher Ground, and with the sides or Tops of Mountains; which would be a thing of real and very great use in many respects. So likewise for the Hygrobaroscopes: were they all adjusted after the same Standard, there would be a fixt and standing Rule whereby to judge of the Gravity of Fluids all over the World wherever

ever these Instruments were used. The Gravity of the *Water* of one Sea might be compared with that of another: of the Northern with the Southern Seas: of the Seas under the *Equinoctial*, with those at the *Poles*. So also of different parts of the same Sea, the *Shores* with the *Main*, or the *Waters* of the very same place, taken up at different depths, with each other. In the same manner may be examined the *Water* of *Lakes*, of *Rivers*, of *Mines*, *Cole-Pits*, &c. of *Springs* of all Sorts, both the *Mineral* ones and others, all over the *World*.

F I N I S.

